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NATIONAL DAM INSPECTION PROGRAM. LAKE JO-ANN DAM (BRACCO DAM) (U)  
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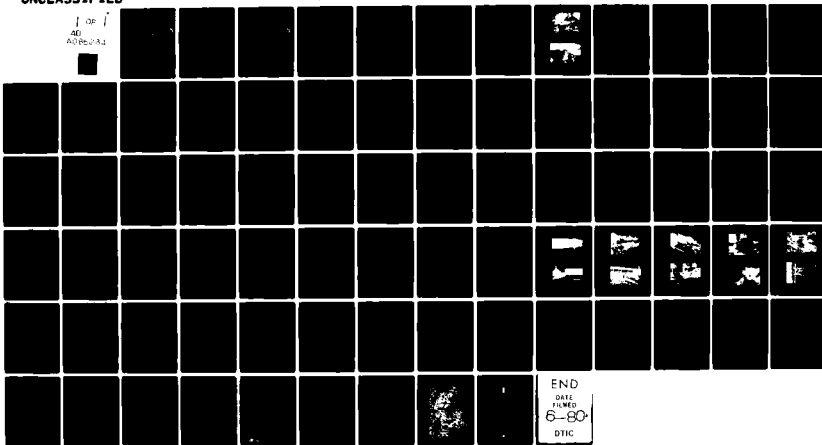
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OHIO RIVER BASIN  
BRANCH OF PETERS CREEK, WASHINGTON COUNTY  
PENNSYLVANIA

LAKE JO-ANN DAM

NDI No. PA 00504  
PennDER No. 63-60

LEVEL

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

MICHAEL BAKER, JR., INC.

DACW31-80-C-0020 0025



prepared for

DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

prepared by

MICHAEL BAKER, JR., INC.

Consulting Engineers  
4301 Dutch Ridge Road  
Beaver, Pennsylvania 15009

May 1980

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OHIO RIVER BASIN

LAKE JO-ANN DAM (BRACCO DAM)  
WASHINGTON COUNTY, COMMONWEALTH OF PENNSYLVANIA  
NDI No. PA 00504  
PennDER No. 63-60

PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM

DTIC  
JUN 6 1980

Lake Jo-Ann Dam (BRACCO DAM)  
NDI Number PA 00504, PennDER  
Number 63-60, Ohio River Basin's Branch  
of Peters Creek, Washington County, Pennsylvania.  
Phase I Inspection Report

Prepared for: DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

Prepared by: MICHAEL BAKER, JR., INC.  
Consulting Engineers  
4301 Dutch Ridge Road  
Beaver, Pennsylvania 15009

(15) DAZW 31-80-C-002.5

(12) 766

(10) John A. Dziubek

410795 sk

## PREFACE

This report is prepared under guidance contained in the "Recommended Guidelines for Safety Inspection of Dams," for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

Check For	✓
1. DDC TAB	✓
2. Unannounced Justification	✓
3. File	✓
4. Distribution	✓
5. Approved by	✓
6. Date of	✓
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8. A-23	✓

PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Lake Jo-Ann Dam, Washington County, Pennsylvania  
NDI No. PA 00504, PennDER No. 63-60  
Inspected 28 March 1980

ASSESSMENT OF  
GENERAL CONDITIONS

Lake Jo-Ann Dam, formerly known as Bracco Dam, is classified as a "High" hazard - "Small" size dam. The dam and reservoir, owned by Mr. Daniel Carapellucci, Sr., are used for recreational purposes. The dam was found to be in fair overall condition at the time of the inspection.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will pass 27.5 percent of the Probable Maximum Flood (PMF) before overtopping of the dam occurs. A spillway design flood (SDF) in the range of the 1/2 Probable Maximum Flood (1/2 PMF) to the PMF is required for Lake Jo-Ann Dam. Because the dam is on the low end of the "Small" size category, the 1/2 PMF was selected as the SDF. It was determined that during the 1/2 PMF the embankment would be overtopped by a maximum depth of 0.89 foot and a total duration of 5.00 hours. Because a limiting criteria of one foot or greater of overtopping and duration in excess of 2 hours was estimated for this dam, it was concluded that a dam failure during the 1/2 PMF is unlikely to occur. Therefore, the spillway is considered to be "inadequate" but not "seriously inadequate." It is recommended that the owner immediately initiate an engineering study to further evaluate the spillway capacity and develop recommendations for remedial measures to reduce the overtopping potential of the dam.

The inspection and review of information revealed certain items of work which should be performed without delay by the owner. Items 1 through 5 should be completed under the direction of a qualified professional engineer experienced in the design of hydraulic and appurtenant structures for earth dams.

- 1) The owner should immediately initiate an engineering study to further evaluate the spillway capacity in order to develop recommendations for remedial measures to reduce the overtopping potential of the dam.

## LAKE JO-ANN DAM

- 2) Repair and reconstruct the outlet works.
- 3) Repair the left spillway training wall immediately downstream from the spillway weir where it is being undermined.
- 4) Remove the tree growing on the right side of the discharge channel immediately downstream from the weir which is pushing the discharge channel training wall out of place. The training wall should also be repaired and the clear seepage flow at this point should be monitored.
- 5) Remove the trees which are growing within 20 feet of the spillway structure. Trees outside of this area do not present any problems because of the large crest width of the dam, making their removal unnecessary.
- 6) Repair the spalled areas on the spillway weir.
- 7) The spillway discharge channel should be cleared of debris and vegetation and repaired. The undermined area at the downstream end of the channel should be filled and repaired.
- 8) The eroded area at the junction of the embankment and the right spillway training wall should be filled. In addition, it is advisable that the owner attempt to maintain a cover of grass or crushed stone on the upstream face of the embankment to prevent the minor erosion presently occurring.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rainfall, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, operation, and record-keeping procedures be developed and implemented.

LAKE JO-ANN DAM

Submitted by:

MICHAEL BAKER, JR., INC.



John A. Dziubek  
John A. Dziubek, P.E.  
Engineering Manager-Geotechnical

Date: 8 May 1980

Approved by:

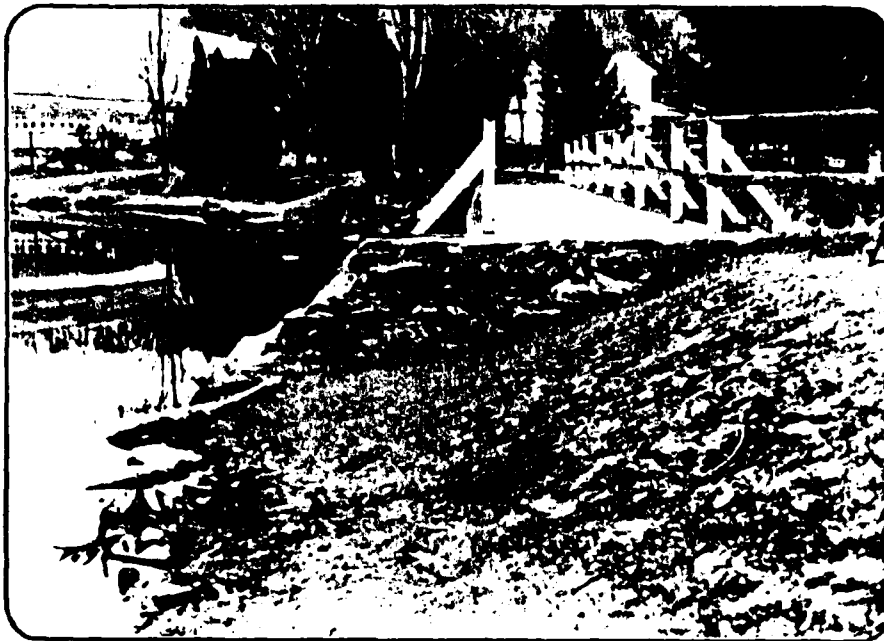
DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS

James W. Peck  
JAMES W. PECK  
Colonel, Corps of Engineers  
District Engineer

Date: 28 May 1980



**LAKE JO-ANN DAM**



**View of the Upstream Face of the Embankment Looking from the Center of the Dam to the Left Abutment**



**View of the Upstream Face of the Embankment Looking from the Spillway to the Right Abutment**

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## APPENDICES

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Appendix B - Engineering Data Check List
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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
LAKE JO-ANN DAM (BRACCO DAM)  
NDI No. PA 00504, PennDER No. 63-60

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection - The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances - Lake Jo-Ann Dam, formerly known as Bracco Dam, is an earthfill embankment 515 feet long. The height of the dam is 15.6 feet, measured from the minimum crest elevation to the streambed at the downstream end of the spillway. The crest width of the embankment ranges from a minimum of 100 feet to as much as 200 feet. Because the crest of the embankment extends for such a long distance downstream, there is no distinguishable downstream toe or face to the dam. The slope of the upstream face is 4H:1V (Horizontal to Vertical).

The spillway, located approximately 120 feet from the left abutment, consists of a sandstone block weir 52.5 feet wide (see Appendix D, Sheet 5, for spillway profile). The top width of the weir, parallel to the direction of flow, is 2.5 feet. The upstream face of the weir is vertical and approximately 13 feet high. The downstream face is slightly rounded with an overall slope of 4H:1V. There is a 3.5 foot drop from the crest of the weir to the discharge channel on the downstream side of the weir.

The spillway training walls are an average of 2.5 feet thick and are constructed of rough sandstone blocks mortared together. These walls extend a minimum of 3.6 feet above the crest of the weir.

A grouted rock discharge channel with a 13 percent slope extends 45 feet downstream from the crest of the weir. Sandstone blocks, with some concrete block additions, form the training walls for the discharge channel. At the end of the discharge channel, there is a 3 foot drop to an earth-lined trapezoidal channel which extends 200 feet downstream. At that point, flow passes through a 48 inch corrugated metal pipe under a small bridge and on to the natural stream channel.

The outlet works for the dam consist of a 24 inch corrugated metal pipe located at the base of the upstream face of the spillway weir. A 24 inch slide gate located on the upstream face of the weir controls the outlet works. The pipe was intended to discharge into the spillway discharge channel; however, modifications made to the discharge channel have blocked the outlet of the pipe.

- b. Location - Lake Jo-Ann Dam is located in Peters Township, Washington County, Pennsylvania, on an unnamed tributary to Peters Creek. The structure is located approximately 3800 feet upstream of Venetia, Pennsylvania. The coordinates of the dam are N 40° 15.4' and W 80° 02.8'. The dam and reservoir can be located on the USGS 7.5 minute topographic quadrangle, Bridgeville, Pennsylvania.
- c. Size Classification - The height of the dam is 15.6 feet and the reservoir volume at the top of the dam is 187 acre-feet. The dam is therefore in the "Small" size category.
- d. Hazard Classification - Loss of life and moderate economic damage is likely to result from a failure of the dam since there are several residential structures located immediately downstream. The dam is therefore considered to be in the "High" hazard category.
- e. Ownership - The dam and reservoir are owned by Mr. Daniel Carapellucci, Sr., 1827 Ridge Road, Library, Pennsylvania 15129.
- f. Purpose - The reservoir is used for fishing and other recreational purposes.
- g. Design and Construction History - The dam was designed and built for Joseph Bracco in 1950. Mr. Mose Smith, P.E., of Pittsburgh, Pennsylvania, performed the design work for the dam. The design

plan, included as Plate 3 in the report, is the only information available concerning the dam. Modifications made to the design plan are discussed in Section 2.

- h. Normal Operational Procedures - The present owner of the dam has not attempted to operate the outlet works since he purchased the dam 10 to 12 years ago. The reservoir is typically at the spillway crest elevation (Elevation 1033.0 feet Mean Sea Level [M.S.L.]).

The owner maintains a small office and store at the site of the dam. As a result, he frequently inspects the embankment and spillway.

### 1.3 PERTINENT DATA

- a. Drainage Area (square miles) - 1.62
- b. Discharge at Dam Site (c.f.s.) -
- |   |     |
|---|-----|
| Spillway Capacity at Minimum Top of Dam (El. 1036.4 ft. M.S.L.) | 988 |
|---|-----|
- c. Elevation (feet above M.S.L.) -
- |                       |                     |
|-----------------------|---------------------|
| Design Top of Dam -   | 1037.0 <sup>1</sup> |
| Minimum Top of Dam -  | 1036.4              |
| Average Top of Dam -  | 1036.8              |
| Maximum Design Pool - | Unknown             |
| Normal Pool -         | 1033.0              |
| Crest of Weir -       | 1033.0              |
| Maximum Tailwater -   | Unknown             |
- d. Reservoir (feet) -
- |                          |      |
|--------------------------|------|
| Length of Maximum Pool - | 1720 |
| Length of Normal Pool -  | 1670 |
- e. Storage (acre-feet) -
- |                                       |     |
|---------------------------------------|-----|
| Normal Pool (El. 1033.0 ft. M.S.L.) - | 125 |
| Top of Dam (El. 1036.4 ft. M.S.L.) -  | 187 |

<sup>1</sup>Elevations shown on the design plan for the dam are 112 feet higher than those estimated on the USGS quadrangle for the area. All elevations listed in this report are referenced to the spillway crest elevation of 1033.0 feet M.S.L. measured on the USGS quad.

f. Reservoir Surface (acres) -

Top of Dam (El. 1036.4 ft. M.S.L.) - 24.1  
Normal Pool (El. 1033.0 ft. M.S.L.) - 13.8

g. Dam -

Type - Earthfill  
Length (feet) - 515  
Height (feet) - 15.6  
Crest Width (feet) - Ranges from 100 to 200  
Side Slopes - Upstream - 4H:1V  
Downstream - No definite downstream face

Zoning - No information on zoning available.

Impervious Core - The design plans show that a clay core with 1H:1V side slopes and a 6 foot top width extends to within two feet of the crest of the embankment. This core is included in only 250 feet of the embankment, from Stations 0+90 to 3+40.

Cut-off - The design plans show that a clay-filled cut-off trench was constructed below the clay core. The trench has a bottom width of 10 feet and 1H:1V side slopes.

h. Diversion and Regulating Tunnel - None

i. Spillway -

Type - Sandstone block, broad-crested weir with a vertical upstream face and slightly rounded downstream face.

Location - Approximately 120 feet from the left abutment.

Length of Crest (perpendicular to the direction of flow) - 52.5 feet

Top Width of Crest (parallel to the direction of flow) - 2.5 feet

Crest Elevation (feet M.S.L.) - 1033.0

Gates - None

Downstream Channel - A grouted rock discharge channel with a 13 percent slope extends 45 feet downstream from the crest of the weir. Sandstone blocks, with some concrete block additions, form the training walls for the discharge channel. At the end of the channel, there

is a 3 foot drop to an earth-lined trapezoidal channel which extends 200 feet downstream.

- j. Outlet Works - The outlet works for the dam consist of a 24 inch corrugated metal pipe controlled by a 24 inch sliding gate. The entrance to the outlet is located at the base of the upstream face of the weir. The invert at the entrance is, according to the design plans, at Elevation 1020.0 feet M.S.L. or 13 feet below the crest of the weir. The outlet of the pipe is located in the spillway discharge channel approximately 24 feet downstream of the crest of the weir. The outlet has been buried by material used to fill in the discharge channel and could not be inspected. The controls for the outlet works are located on the upstream face of the weir at the entrance to the outlet pipe. The controls have not been operated in the past 10 to 12 years. A heavy coating of rust has also developed on the controls for the gate.

## SECTION 2 - ENGINEERING DATA

### 2.1 DESIGN

Lake Jo-Ann Dam was designed in 1950 by Mr. Mose Smith, P.E., of Pittsburgh, Pennsylvania, for Mr. Joseph Bracco. A set of design plans is available in the Pennsylvania Department of Environmental Resources' (PennDER) File No. 63-60. No other information pertaining to the design of the structure is available.

### 2.2 CONSTRUCTION

The dam was originally built for Mr. Joseph Bracco to be used for recreational purposes. No detailed information on the construction history of the dam could be obtained. However, the present owner of the dam, Mr. Carapellucci, stated that a small coal strip mine was operated on the current site of the dam and impoundment. Material was excavated from the impoundment area and placed at the embankment location.

The design plans show the length and crest width of the embankment to be 250 feet and 16 feet, respectively, while the length and crest width measured during the field inspection were 515 feet and over 100 feet, respectively. The 250 feet of embankment to be built corresponds to the portion of embankment extending from Station 0+90 to 3+40 on the top of dam profile included in Appendix D. Outside of these stations, the embankment appears to be overburden material from the old strip mine and may explain the crest width of over 100 feet.

The design plans show a clay core and cut-off trench included in the embankment. This information could not be verified.

There are also several discrepancies between information shown on the design plans and that obtained during the field inspection. These discrepancies include the following:

- 1) The upstream face of the embankment was supposed to be covered with riprap on a 6 inch gravel base. No riprap was observed.
- 2) The designed spillway was 55 feet wide. The measured width was 52.5 feet.



- 3) The design plans show that flow through the spillway would fall approximately 13 feet after passing over the crest of the weir. It appears that after the weir was built additional rock fill material was grouted in place in the discharge channel. This material decreased the fall over the weir to 3.5 feet and created a 13 percent slope in the discharge channel which had a flat design slope. This material also covered the outlet of the 24 inch corrugated metal pipe which served as the outlet works for the dam.

The grout used in the discharge channel was also applied to the downstream face of the weir, rounding it off slightly.

### 2.3 OPERATION

The present owner of the dam and impoundment, Mr. Daniel Carapellucci, is responsible for the operation and maintenance of the structure.

### 2.4 EVALUATION

- a. Availability - A set of design plans in the PennDER file for the dam is the only information available.
- b. Adequacy - The information available and that collected during the course of this inspection is adequate for a Phase I Inspection of the dam.
- c. Validity - There are many important discrepancies between the design plans and the present conditions of the dam. Therefore, the design plans are not indicative of actual conditions at the dam site.

## SECTION 3 - VISUAL INSPECTION

### 3.1 FINDINGS

- a. General - The inspection was performed on 28 March 1980. No unusual weather conditions were experienced and the lake was 0.2 foot above normal pool. The dam and appurtenant structures were found to be in fair overall condition. Noteworthy deficiencies observed during the visual inspection are described in the following paragraphs. The complete visual inspection check list, field sketch, top of dam profile, and typical cross-section are presented in Appendix A.
- b. Dam - No serious deficiencies were noted during the visual inspection of the embankment. There is some minor erosion of the upstream face of the embankment. The embankment is so wide, however, that this is only a problem at the junction of the embankment and the right spillway training wall. At this point, erosion has moved the crest back several feet, exposing a portion of the wall (see Top Overall Photo).

There are also a number of large trees growing on the embankment. However, this does not represent a problem due to the extreme width of the dam crest.

- c. Appurtenant Structures - The deficiencies observed are as follows:
  - 1) The controls for the outlet works are heavily coated with rust and have not been operated for at least 10 to 12 years. The exit of the outlet conduit has also been buried by modifications made to the spillway discharge channel. It is extremely doubtful that the outlet works, in their present condition, are functional.
  - 2) The grouted rock spillway discharge channel has badly deteriorated, leaving many large cracks and openings. Some debris and vegetation have also accumulated in the channel. The downstream end of the channel is being undermined and is also deteriorating. There is some flow from underneath the discharge channel (see Photo 8) which is probably a result of water entering cracks and holes in the upper portions of the channel.

- 3) A tree growing on the right side of the discharge channel, immediately downstream from the weir, is pushing the discharge channel training wall out of place (see Photo 6). There is also some clear seepage (approximately 2 g.p.m.) at the base of the wall.
  - 4) The left training wall of the discharge channel has been undermined immediately downstream from the weir.
  - 5) There is some minor spalling on the downstream face of the weir.
  - 6) There is a 1 foot high fish screen at the crest of the spillway weir. A small amount of trash has accumulated in front of the screen; however, this debris is not significantly reducing flow over the weir.
- d. Reservoir Area - The slopes of the reservoir and watershed are moderate. The area to the east of the reservoir is primarily farmland; the areas to the west and north are forested. No significant sediment accumulation in the reservoir was observed. The original depth of the reservoir is unknown and the current depth averages 10 feet according to the owner.
- e. Downstream Channel - The downstream channel is mildly sloping and tree-lined. There are no obstructions in the channel except for a 48 inch corrugated metal pipe culvert located approximately 200 feet downstream from the spillway. Five residential structures are located approximately 1500 feet downstream from the dam. A small fishing pond is also located approximately 250 feet downstream from the dam and to the left of the stream channel.

## SECTION 4 - OPERATIONAL PROCEDURES

### 4.1 PROCEDURES

There are no formal procedures for operating the reservoir or evacuating the downstream area in case of an impending failure of the dam. It is recommended that formal emergency procedures be adopted.

### 4.2 MAINTENANCE OF DAM

The owner of the dam, Mr. Daniel Carapellucci, is responsible for maintenance of the structure. Generally, the maintenance procedures for the embankment are considered adequate. However a more conscientious program to prevent erosion of the embankment, especially around the spillway, should be adopted.

### 4.3 MAINTENANCE OF OPERATING FACILITIES

The spillway and outlet works have been poorly maintained. Both have badly deteriorated and are in need of extensive repairs. A more rigorous maintenance program to prevent this from continuing should be adopted.

### 4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

There is no warning system in effect in the event of a dam failure. An emergency warning system should be developed.

### 4.5 EVALUATION OF OPERATIONAL ADEQUACY

The outlet works and spillway require relatively extensive repairs as a result of poor maintenance and post-construction modifications made to the dam. The outlet works are not functional at this time and should be restored to an operational condition as soon as possible.

## SECTION 5 - HYDRAULIC/HYDROLOGIC

### 5.1 EVALUATION OF FEATURES

- a. Design Data - There is no detailed hydrologic or hydraulic design information available for Lake Jo-Ann Dam.
- b. Experience Data - No records concerning the effects of significant floods on the dam and spillway are available.
- c. Visual Observation - The area downstream of the dam has been filled in to approximately the same elevation as the average top of dam elevation. As a result, the crest of the dam ranges from a minimum of 100 feet to almost 200 feet wide. A parking lot and several structures have been constructed on this fill.

No conditions were observed at the time of the inspection that would indicate the dam and spillway could not operate satisfactorily in the event of a flood. However, as noted in previous sections, both the spillway and outlet works are in need of repair. The outlet works are inoperable at this time and cannot be used to draw down the reservoir.

- d. Overtopping Potential - Lake Jo-Ann Dam is a "Small" size - "High" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of the 1/2 Probable Maximum Flood (1/2 PMF) to the Probable Maximum Flood (PMF). Because the dam is on the low end of the "Small" size category, the 1/2 PMF was selected as the SDF.

The hydraulic capacity of the dam, reservoir, and spillway was assessed by utilizing the U.S. Army Corps of Engineers' Flood Hydrograph Package, HEC-1 DB. The hydrologic characteristics of the drainage basin, specifically, the Snyder's unit hydrograph parameters, were obtained from a regionalized analysis conducted by the Baltimore District of the Corps of Engineers.

Analysis of the dam and spillway show that the dam would be overtopped by the SDF. The depth and duration of overtopping are 0.89 foot and 5.00 hours, respectively. The spillway is capable of passing approximately 27.5 percent of the PMF before overtopping begins.

- e. Spillway Adequacy - As outlined in the above analysis, the dam would be overtopped by the SDF. The next criteria for determining spillway adequacy requires an estimate of whether the dam will fail during the 1/2 PMF. The following conditions, as well as the overall state of the dam, were estimated as the limiting criteria which are likely to cause failure of the dam.

- 1) Depth of overtopping of 1.0 foot or greater.
- 2) Duration of overtopping in excess of 2.0 hours.

The overtopping analysis of the dam yielded the following values for the 1/2 PMF.

- 1) Depth of overtopping equal to 0.89 feet.
- 2) Duration of overtopping equal to 5.00 hours.

Based on these criteria and the overall state of the dam, it is estimated that failure is not likely to occur during the 1/2 PMF. The spillway is therefore rated as "inadequate" but not "seriously inadequate."

## SECTION 6 - STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations - No signs of distress were observed on the embankment during the visual inspection. However, clear seepage (approximately 2 g.p.m.) was observed at the base of the right spillway training wall. Erosion of the upstream face of the embankment has moved the crest of the dam back several feet, exposing a portion of the right spillway training wall. Neither of these conditions represents a threat to the continued structural stability of the training wall at this time.

The left spillway training wall is being undermined immediately downstream from the spillway weir. While this undermining is not serious at this time, it may eventually jeopardize the stability of the wall if allowed to continue.

- b. Design and Construction Data - Calculations of structural stability were not available for review. No information concerning the dam foundation materials or conditions is available. It is estimated that because of the extremely large crest width of this dam, its history of satisfactory slope performance, and no indications of embankment instability; further assessments of the stability of the structure are not necessary for this Phase I Inspection Report.
- c. Operating Records - No operating records are available for Lake Jo-Ann Dam. Nothing in the operational information available indicates concern relative to the structural stability of the dam.
- d. Post-Construction Changes - No known changes adversely affecting the structural stability of the dam have been performed.
- e. Seismic Stability - The dam is located in Seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, Page D-30, "Recommended Guidelines for the Safety Inspection of Dams." This is a zone of minor seismic activity. Therefore, further consideration of the seismic stability is not warranted.

## SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

### 7.1 DAM ASSESSMENT

- a. Safety - Lake Jo-Ann Dam, formerly known as Bracco Dam, was found to be in fair overall condition at the time of inspection. The dam is a "High" hazard - "Small" size dam requiring a spillway capacity in the range of the 1/2 PMF to PMF. The 1/2 PMF was chosen as the SDF because the dam is on the low end of the "Small" size category. As presented in Section 5, the spillway is capable of passing 27.5 percent of the PMF without overtopping the dam. During the 1/2 PMF, the depth and duration of overtopping are 0.89 foot and 5.00 hours, respectively. Because a limiting criteria of one foot or greater of overtopping and duration in excess of 2 hours was estimated for this dam, it was concluded that a dam failure during the 1/2 PMF is unlikely to occur. Therefore, the spillway is considered to be "inadequate" but not "seriously inadequate."
- b. Adequacy of Information - The information available and the observations made during the visual inspection are considered sufficient for a Phase I Inspection Report.
- c. Urgency - The owner should initiate the action discussed in paragraph 7.2 without delay and immediately initiate the further investigation discussed in paragraph 7.1.d.
- d. Necessity for Additional Data/Evaluation - The hydraulic/hydrologic analysis performed in connection with this Phase I Inspection Report has indicated the need for additional spillway capacity. It is recommended that the owner of Lake Jo-Ann Dam immediately initiate an engineering study to further evaluate the spillway capacity in order to develop recommendations for remedial measures to reduce the overtopping potential of the dam.

### 7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection and review of information revealed certain items of work which should be performed without delay by the owner. Items 1 through 5 should be completed under the direction of a qualified professional engineer experienced in the design of hydraulic and appurtenant structures for earth dams.



- 1) The owner should immediately initiate an engineering study to further evaluate the spillway capacity in order to develop recommendations for remedial measures to reduce the overtopping potential of the dam.
- 2) Repair and reconstruct the outlet works.
- 3) Repair the left spillway training wall immediately downstream from the spillway weir where it is being undermined.
- 4) Remove the tree growing on the right side of the discharge channel immediately downstream from the weir which is pushing the discharge channel training wall out of place. The training wall should also be repaired and the clear seepage flow at this point should be monitored.
- 5) Remove the trees which are growing within 20 feet of the spillway structure. Trees outside of this area do not present any problems because of the large crest width of the embankment, making their removal unnecessary.
- 6) Repair the spalled areas on the spillway weir.
- 7) The spillway discharge channel should be cleared of debris and vegetation and repaired. The undermined area at the downstream end of the channel should be filled and repaired.
- 8) The eroded area at the junction of the embankment and the right spillway training wall should be filled. In addition, it is advisable that the owner attempt to maintain a cover of grass or crushed stone on the upstream face of the embankment to prevent the minor erosion presently occurring.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rainfall, provide around-the-clock surveillance of the dam.

- 3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, operation, and record-keeping procedures be developed and implemented.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH,  
TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Check List  
Visual Inspection  
Phase 1

Name of Dam Lake Jo-Ann Dam County Washington State PA Coordinates Lat. N 40°15.4'  
(Bracco Dam) Long. W 80°02.8'  
NDI # PA 00504  
PENNDER # 63-60  
Date of Inspection 28 March 1980 Weather Cloudy Temperature 45° F.

Pool Elevation at Time of Inspection 1033.2 ft.\* M.S.L. Tailwater at Time of Inspection 1021.0 ft.\* M.S.L.

\*All elevations referenced to spillway crest, El. 1033.0 ft. M.S.L.  
Elevations shown on design plans are 112 feet higher than those cited in this report.

Inspection Personnel:

Michael Baker, Jr., Inc.:

Jeffrey A. Quay  
Wayne D. Lasch  
Jeffrey S. Maze

Field Review (23 April 1980)

John A. Dziubek  
James G. Ulinski

Owner's Representatives:

Daniel Carapellucci, Sr.

Jeffrey A. Quay Recorder

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: LAKE JO-ANN DAM  
NDI # PA 00504

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE		
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS		
DRAINS		
WATER PASSAGES		
FOUNDATION		

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: LAKE JO-ANN DAM  
NDI # PA 00504

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES		
STRUCTURAL CRACKING		
VERTICAL AND HORIZONTAL ALIGNMENT		
MONOLITH JOINTS		
CONSTRUCTION JOINTS		

EMBANKMENT

Name of Dam LAKE JO-ANN DAM  
 NDI # PA 00504

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None were observed. The embankment is so wide that it does not have a distinct toe or downstream face.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	There is some erosion of the upstream embankment but the embankment is so wide that this does not present a problem.	

EMBANKMENT

Name of Dam LAKE JO-ANN DAM  
 NDI # PA 00504

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No problems observed in either the vertical or horizontal alignment.	

RIPRAP FAILURES

No riprap was used on the dam.

VEGETATION

There is only a very sparse growth of short grass on the embankment. Medium size trees are growing along the crest of the embankment and along the side of the discharge channel.

The owner said it is difficult to maintain grass on the embankment; people walking over the embankment to use the lake tend to kill any grass which may be growing. Because of the large crest width of the dam, it is not necessary to remove all of the trees on the embankment. The trees growing within 20 feet of the spillway structure should be removed; this is the only area where the trees may present a problem.



EMBANKMENT

Name of Dam LAKE JO-ANN DAM

NDI # PA 00504

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The junctions of the embankment and the abutments are ill-defined but no problems were observed in these areas. The junctions of the spillway and dam are in good condition except that erosion of the embankment on the right side of the spillway has moved the crest of the dam back several ft., exposing a portion of the right spillway training wall.	The eroded area by the right spillway training wall should be repaired.
ANY NOTICEABLE SEEPAGE	Clear seepage estimated at 2 g.p.m. was observed exiting beneath the tree at the end of the right spillway training wall.	This seepage should be monitored in future inspections for turbidity or increase in quantity of flow.

STAFF GAGE AND RECORDER      None

DRAINS      None

OUTLET WORKS

Name of Dam: LAKE JO-ANN DAM  
NDI # PA 00504

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None		
INTAKE STRUCTURE	None		
OUTLET STRUCTURE	None		
OUTLET CHANNEL	None		
EMERGENCY GATE		Controls for a 24 in. slide gate are located on the right side of the spillway immediately upstream of the weir. The gate was submerged at the time of the inspection. The owner of the dam said that the gate has not been operated since he bought the dam 10 to 12 years ago. The controls are covered with an extremely heavy coat of rust and appeared to be inoperable.	A detailed inspection of the gate to determine how it can be made functional should be made.

UNGATED SPILLWAY

Name of Dam: LAKE JO-ANN DAM  
NDI # PA 00504

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The weir is in fair condition. There are some surface irregularities and minor spalling on the downstream face of the weir.	Repair the spalled areas.
APPROACH CHANNEL	None	
DISCHARGE CHANNEL	A grouted rock discharge channel extends 45 ft. downstream from the weir. The channel has been washed out (broken out) in several areas. Some debris and vegetation has also accumulated in the channel. A tree growing on the right side of the channel, immediately downstream from the weir, is pushing the discharge channel training wall into the channel. At the downstream end of the channel there is a 3 ft. drop to a natural earth channel. The discharge channel is being undermined at this point. Some water is flowing from underneath the discharge channel. The left training wall has been undermined immediately downstream from the weir.	The discharge channel should be cleared of debris and vegetation and the entire channel repaired. The tree growing on the right side of the channel, immediately downstream from the weir, should be removed and the training wall repaired.
BRIDGE AND PIERS	A wooden footbridge has been constructed over the crest of the spillway. There is also an abandoned vehicle bridge over the spillway discharge channel approximately 30 ft. downstream from the spillway weir. Neither bridge should have a significant effect on flow through the spillway channel.	

GATED SPILLWAY - Not Applicable

Name of Dam: LAKE JO-ANN DAM  
 NDI # PA 00504

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE SILL

APPROACH CHANNEL

DISCHARGE CHANNEL

BRIDGE AND PIERS

GATES AND OPERATION  
EQUIPMENT

9

A-10

INSTRUMENTATION - None

Name of Dam: LAKE JO-ANN DAM  
NDI # PA 00504

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
--------------------	--------------	----------------------------

MONUMENTATION/SURVEYS

OBSERVATION WELLS

WEIRS

PIEZOMETERS

OTHER

RESERVOIR

Name of Dam: LAKE JO-ANN DAM

NDI # PA 00504

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SLOPES

Slopes are mild to moderate. The area to the east of the reservoir is primarily farmland; the area to the west and north is forested.

SEDIMENTATION

There is no evidence that a significant amount of sediment has accumulated in the reservoir. The original depth of the reservoir is unknown and the current depth averages 10 ft.

DOWNSTREAM CHANNEL

Name of Dam: LAKE JO-ANN DAM

NDI # PA 00504

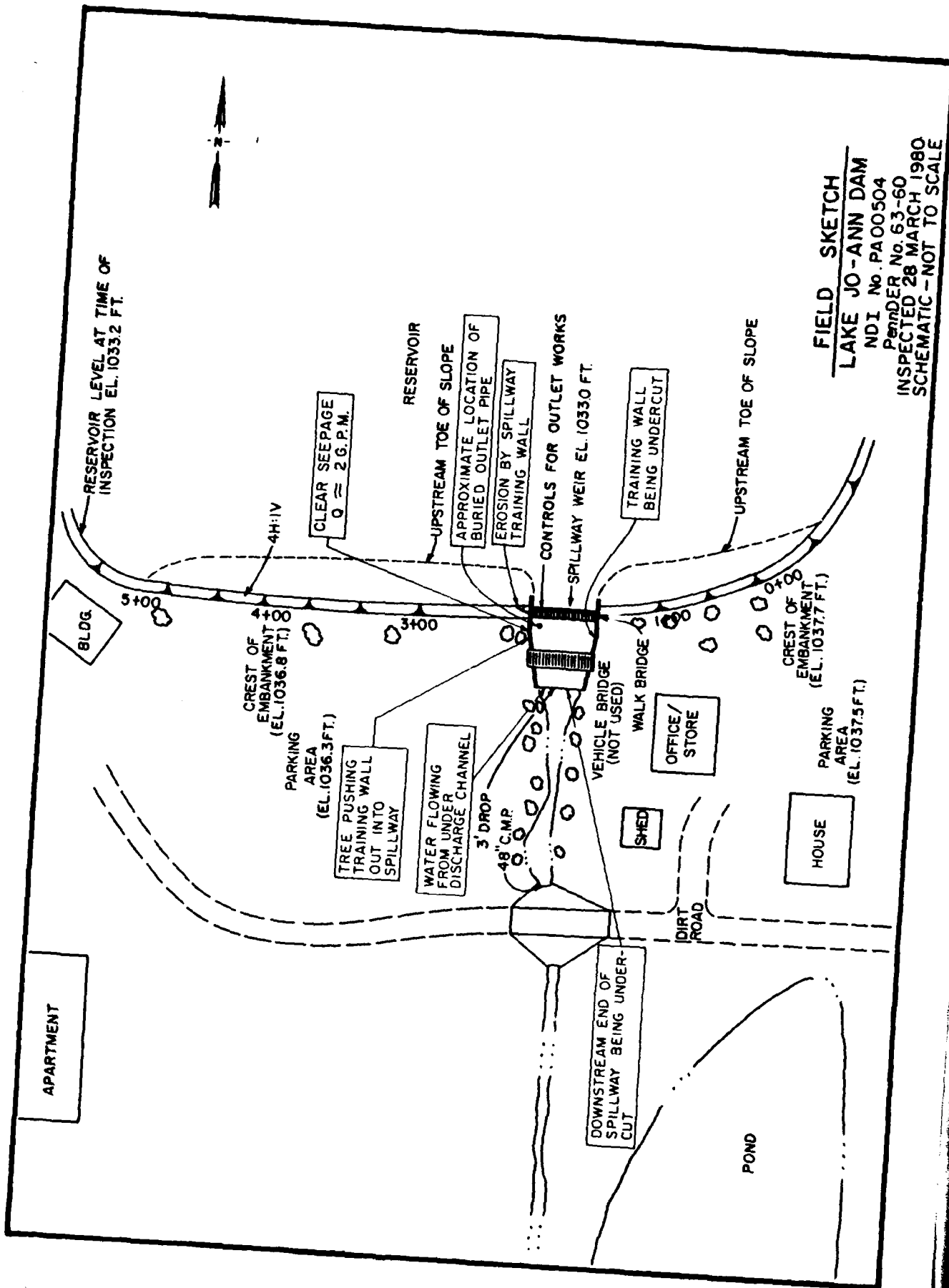
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel is mildly sloping and tree-lined. There are no obstructions in the channel except for a 48 in. C.M.P. culvert approximately 200 ft. downstream from the spillway.	

SLOPES

Channel slopes are mild.

APPROXIMATE NO.  
OF HOMES AND  
POPULATION

Five residential structures are located approximately 1500 ft. downstream from the dam. A small fishing pond is also located approximately 250 ft. downstream from the dam.





MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

31 March 1980

Box 280

Beaver, Pa. 15009

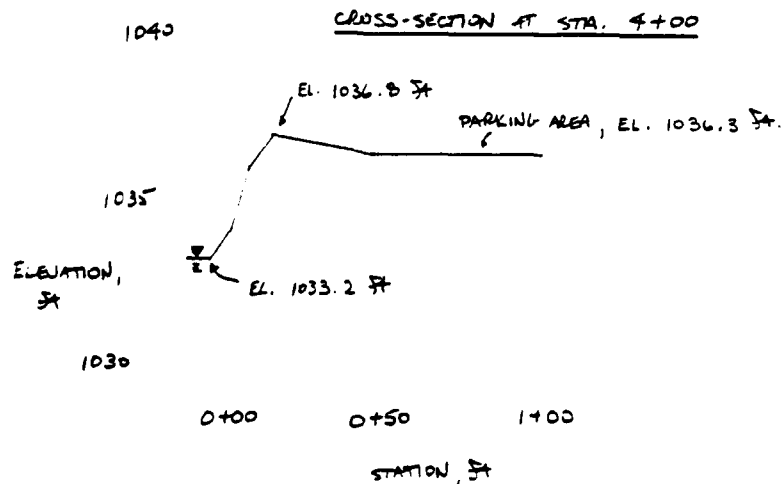
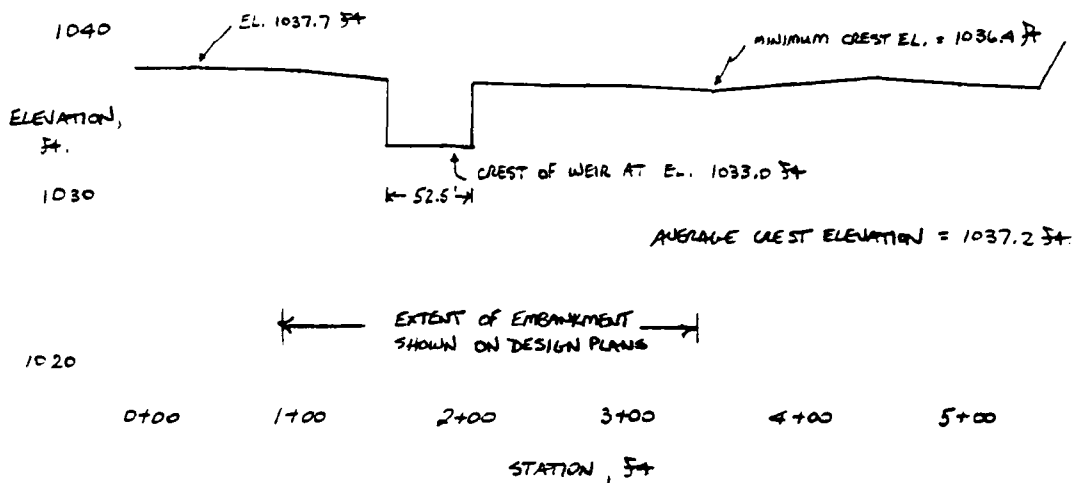
LAKE JO-ANN DAM

A-14

TOP OF DAM PROFILE  
TYPICAL CROSS-SECTION

DATE OF INSPECTION - 28 March 1980

TOP OF DAM PROFILE



APPENDIX B

ENGINEERING DATA CHECK LIST

**CHECK LIST**  
**ENGINEERING DATA**  
**DESIGN, CONSTRUCTION, OPERATION**

Name of Dam: LAKE JO-ANN DAM  
 NDI # PA 00504

ITEM	REMARKS
<b>PLAN OF DAM</b>	See Plate 3 and field sketch included in this report.
<b>REGIONAL VICINITY MAP</b>	The USGS 7.5 minute topographic quadrangle, Bridgeville, Pennsylvania, was used to prepare the vicinity map which is enclosed in this report as the Location Plan (Plate 1).
<b>CONSTRUCTION HISTORY</b>	The dam was designed and built for Joseph Bracco in 1950. No detailed construction information is available. A presentation of the limited information available is given in Section 2.2.
<b>TYPICAL SECTIONS OF DAM</b>	See Appendix A for typical cross-section of dam.
<b>HYDROLOGIC/HYDRAULIC DATA</b>	No information available
<b>OUTLETS - PLAN and DETAILS</b>	See field sketch for location of emergency gate.
<b>- CONSTRAINTS and DISCHARGE RATINGS</b>	No information available
<b>RAINFALL/RESERVOIR RECORDS</b>	None available

Name of Dam: LAKE JO-ANN DAM  
NDI # PA 00504

B-2

ITEM	REMARKS
DESIGN REPORTS	None available
GEOLOGY REPORTS	None are available, see Appendix F for regional geology.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available
POST-CONSTRUCTION SURVEYS OF DAM	None

**BORROW SOURCES**

No information is available. It appears that a great deal of the embankment material came from the refuse generated by the coal mining activities previously conducted at the site of the impoundment.

Name of Dam: LAKE JO-ANN DAM

NDI # PA 00504

B-3

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	Fill material was added to the spillway discharge channel and grouted in place. Other departures from the design plans are discussed in Section 2.2.
HIGH POOL RECORDS	No information available
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	None

Name of Dam: LAKE JO-ANN DAM

NDI # PA 00504

B-4

ITEM

REMARKS

SPILLWAY PLAN

A spillway profile is included in Appendix D.

SECTIONS  
and  
DETAILS

No information available

OPERATING EQUIPMENT  
PLANS & DETAILS

No information available

CHECK LIST  
HYDROLOGIC AND HYDRAULIC DATA  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 1.62 sq.mi. (Primarily forests and farmland)

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1033.0 ft. M.S.L.  
(125 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1036.4 ft. M.S.L.  
(187 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1036.4 ft. M.S.L. (minimum elevation)

SPILLWAY:

- a. Crest Elevation 1033.0 ft. M.S.L.
- b. Type Broad crested sandstone block with slightly rounded downstream face
- c. Width of Crest Parallel to Flow 2.5 ft. (top width)
- d. Length of Crest Perpendicular to Flow 52.5 ft.
- e. Location Spillover 120 ft. from left abutment
- f. Number and Type of Gates None

OUTLET WORKS:

- a. Type 24 in. C.M.P.
- b. Location At base of spillway weir
- c. Entrance Inverts El. 1020.0 ft. M.S.L. (estimated from design plans)
- d. Exit Inverts Exit of pipe is buried
- e. Emergency Drawdown Facilities No functional drawdown facilities at this time

HYDROMETEOROLOGICAL GAGES: None

- a. Type \_\_\_\_\_
- b. Location \_\_\_\_\_
- c. Records \_\_\_\_\_

MAXIMUM NON-DAMAGING DISCHARGE No records available

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS



## DETAILED PHOTOGRAPH DESCRIPTIONS

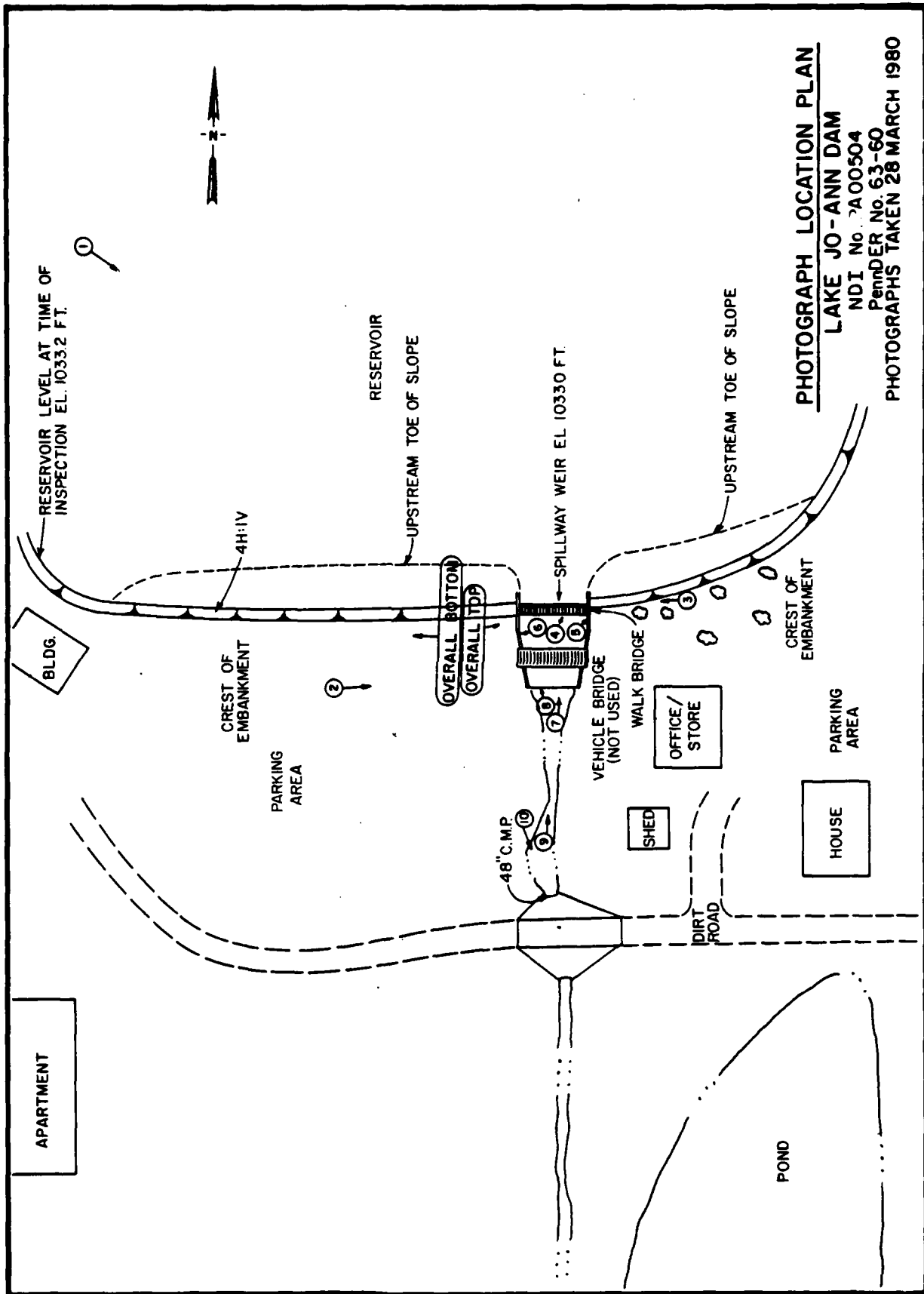
### Overall View of Dam

- Top Photo (OV-T) - View of the Upstream Face of the Embankment Looking from the Center of the Dam to the Left Abutment (Note erosion pushing crest downstream, exposing the right spillway training wall)
- Bottom Photo (OV-B) - View of the Upstream Face of the Embankment Looking from the Spillway to the Right Abutment

### Photograph Location Plan

- Photo 1 - Overall View of Embankment from Reservoir
- Photo 2 - View of the Crest of the Dam from the Right Abutment
- Photo 3 - View of the Upstream Side of the Spillway
- Photo 4 - View of the Spillway Looking Upstream
- Photo 5 - Undercutting of the Left Spillway Training Wall
- Photo 6 - View of Tree Pushing Right Spillway Training Wall Out of Place (Arrow denotes location of clear seepage)
- Photo 7 - Undermining of the Downstream End of the Spillway Discharge Channel
- Photo 8 - View of Water Flowing Out from Beneath the Spillway Discharge Channel
- Photo 9 - View of Downstream Channel Looking Upstream Towards the Spillway
- Photo 10 - View of 48 Inch Corrugated Metal Pipe in the Downstream Channel

Note: Photographs were taken on 28 March 1980.



**PHOTOGRAPH LOCATION PLAN**

**LAKE JO-ANN DAM**

NDI No. 7A00504

Penuder No. 63-60

PHOTOGRAPHS TAKEN 28 MARCH 1980

## LAKE JO-ANN DAM



**PHOTO 1. Overall View of Embankment from Reservoir**



**PHOTO 2. View of the Crest of the Dam from the Right Abutment**

## LAKE JO-ANN DAM



**PHOTO 3. View of the Upstream Side of the Spillway**



**PHOTO 4. View of the Spillway Looking Upstream**

## LAKE JO-ANN DAM



**PHOTO 5. Undercutting of the Left Spillway Training Wall**



**PHOTO 6. View of Tree Pushing Right Spillway Training Wall Out of Place  
(Arrow denotes location of clear seepage)**

## LAKE JO-ANN DAM



**PHOTO 7. Undermining of the Downstream End of the Spillway  
Discharge Channel**



**PHOTO 8. View of Water Flowing Out from Beneath the Spillway  
Discharge Channel**

**LAKE JO-ANN DAM**



**PHOTO 9. View of Downstream Channel Looking Upstream Towards the Spillway**



**PHOTO 10. View of 48 Inch Corrugated Metal Pipe in the Downstream Channel**

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



MICHAEL BAKER, JR., INC.  
THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

Subject LAKE JO-ANN DAM S.O. No. \_\_\_\_\_  
APPENDIX D - HYDROLOGIC AND Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
HYDRAULIC COMPUTATIONS Drawing No. \_\_\_\_\_  
Computed by \_\_\_\_\_ Checked by \_\_\_\_\_ Date \_\_\_\_\_

<u>SUBJECT</u>	<u>PAGE</u>
PREFACE	i
HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE	1
DRAINAGE AREA AND CENTROID MAP	2
TOP OF DAM PROFILE AND CROSS-SECTION	3
HYDRAULIC DATA	4
SPIGWAY PROFILE AND CAPACITY ANALYSIS	5
HEC-1 ANALYSIS	6

## PREFACE

### HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The hydrologic determinations presented in this Phase I Inspection Report are based on the use of a Snyder's unit hydrograph developed by the U.S. Army Corps of Engineers. Due to the limited number of gaging stations available in this hydrologic region and the wide variations of watershed slopes, the Snyder's coefficients may yield results of limited accuracy for this watershed. As directed however, a further refinement of these coefficients is beyond the scope of this Phase I Investigation.

In addition, the conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

HYDROLOGY AND HYDRAULIC ANALYSIS  
DATA BASE

NAME OF DAM: LAKE JO-ANN DAM

PROBABLE MAXIMUM PRECIPITATION (PMP) = 24.0 INCHES/24 HOURS<sup>(1)</sup>

STATION	1	2	3	4	5
Station Description	LAKE JO-ANN DAM				
Drainage Area (square miles)	1.62				
Cumulative Drainage Area (square miles)	1.62				
Adjustment of PMF for Drainage Area (%) <sup>(2)</sup>	Zone 7				
6 Hours	102				
12 Hours	120				
24 Hours	130				
48 Hours	140				
72 Hours	--				
Snyder Hydrograph Parameters					
Zone <sup>(3)</sup>	28				
$C_p/C_t$ <sup>(4)</sup>	0.57/1.7				
L (miles) <sup>(5)</sup>	2.08				
$L_{ca}$ (miles) <sup>(5)</sup>	1.06				
$t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	2.16				
Spillway Data					
Crest Length (ft)	52.5				
Freeboard (ft)	3.4				
Discharge Coefficient	3.00				
Exponent	1.5				

<sup>(1)</sup> Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

<sup>(2)</sup> Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

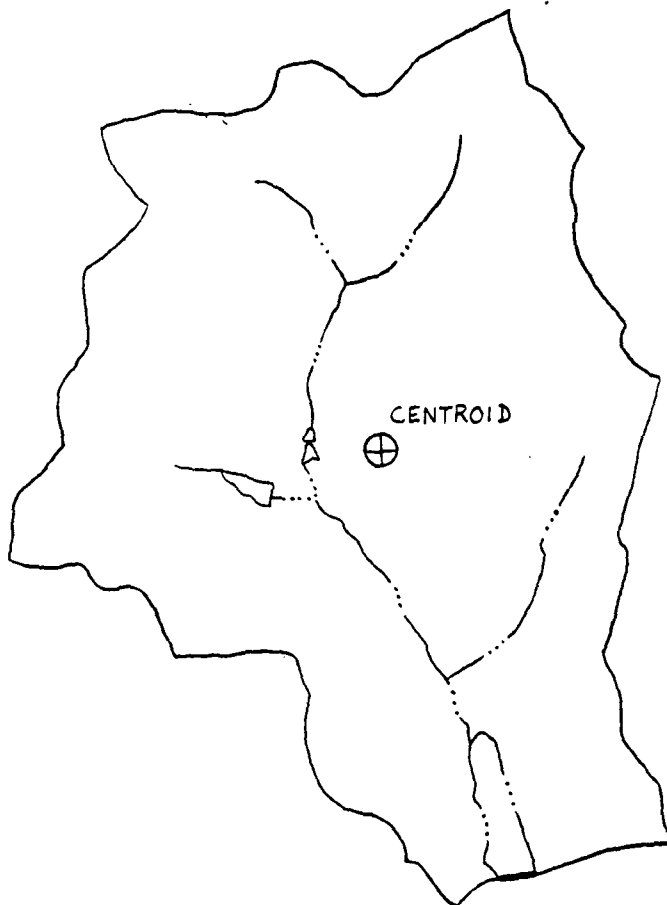
<sup>(3)</sup> Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients ( $C_p$  and  $C_t$ ).

<sup>(4)</sup> Snyder's Coefficients.

<sup>(5)</sup>  $L$  = Length of longest water course from outlet to basin divide.

$L_{ca}$  = Length of water course from outlet to point opposite the centroid of drainage area.

BRACCO DAM  
(LAKE JO-ANN)



BRIDGEVILLE 7.5  
MINUTE USGS QUAD

D.A. = 11.28 IN<sup>2</sup> = 1.62 MI<sup>2</sup>

0 2000 4000  
SCALE

MICHAEL BAKER, JR., INC.  
THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

Subject LAKE JO-ANN DAM

S.O. No. \_\_\_\_\_

TOP OF DAM PROFILE AND

Sheet No. 3 of 10

CROSS-SECTION

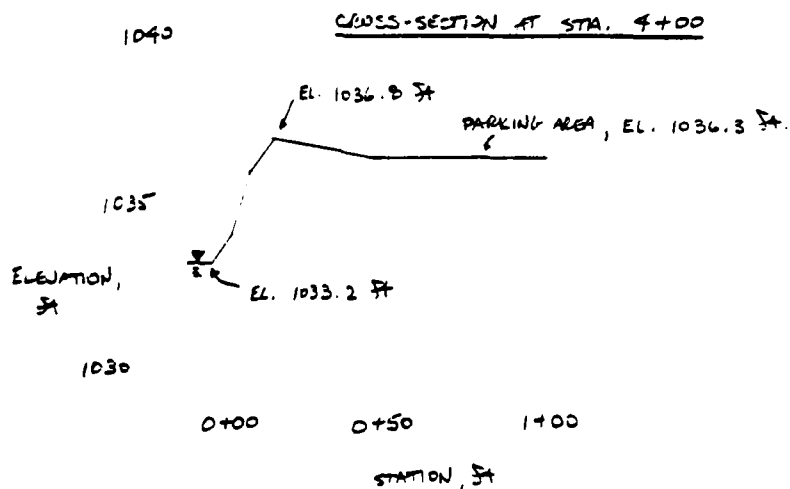
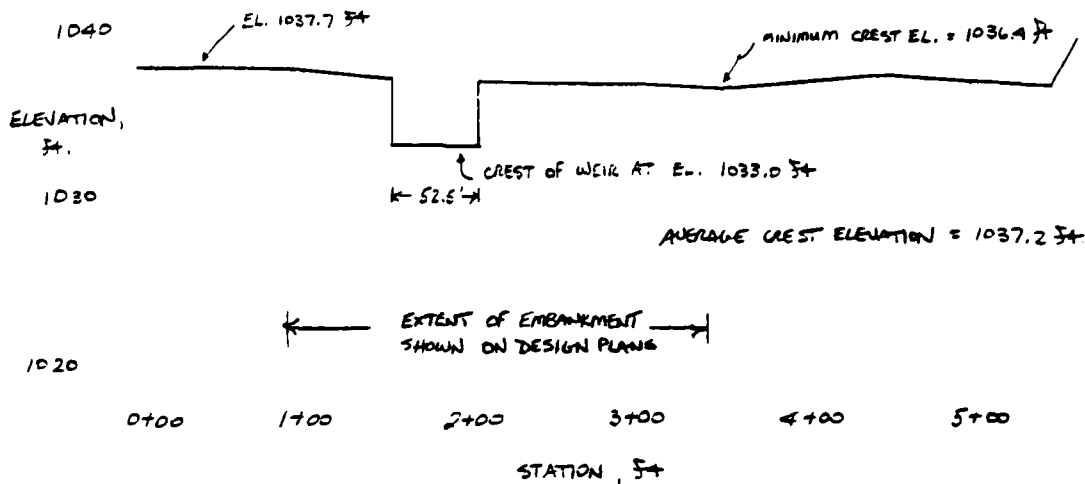
Drawing No. \_\_\_\_\_

Computed by WDL

Checked by \_\_\_\_\_

Date 3-31-80

TOP OF DAM PROFILE



MICHAEL BAKER, JR., INC.  
THE BAKER ENGINEERS

Box 280  
Beaver, Pa. 15009

Subject LAKE JO-ANN DAM S.O. No. \_\_\_\_\_  
HYDRAULIC DATA Sheet No. 4 of 10  
Drawing No. \_\_\_\_\_  
Computed by WDL Checked by WLS Date 4-2-80

STORAGE CALCULATIONS

ELEVATION VS. AREA DATA (MEASURED FROM QUAD) :

ELEVATION, FT	AREA, ACRES
1033.0	13.77
1040	34.9
1060	82.6

NOTE: NORMAL POOL ASSUMED TO  
BE AT EL. 1033.0 FT

NORMAL POOL STORAGE :

$$V_{NP} = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$$

$h$  = AVERAGE DEPTH = 9.5 FT  
(ESTIMATED DURING FIELD INSPECTION)

$A_1$  = NORMAL POOL SURFACE AREA  
= 13.77 AC.

$A_2$  = RESERVOIR BOTTOM SURFACE  
AREA = 12.6 AC.

$$V_{NP} = \frac{9.5}{3} (13.77 + 12.6 + \sqrt{(13.77)(12.6)})$$

NORMAL POOL STORAGE = 125.22 AC-FT

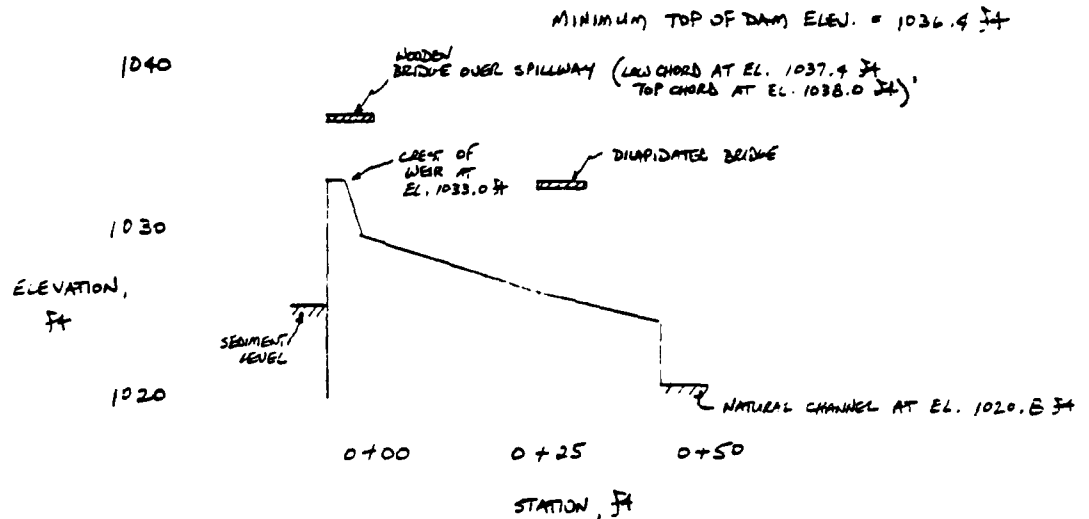
TOP OF DAM STORAGE = 187 AC-FT (FROM HEC-1 ANALYSIS)

MICHAEL BAKER, JR., INC.  
THE BAKER ENGINEERS

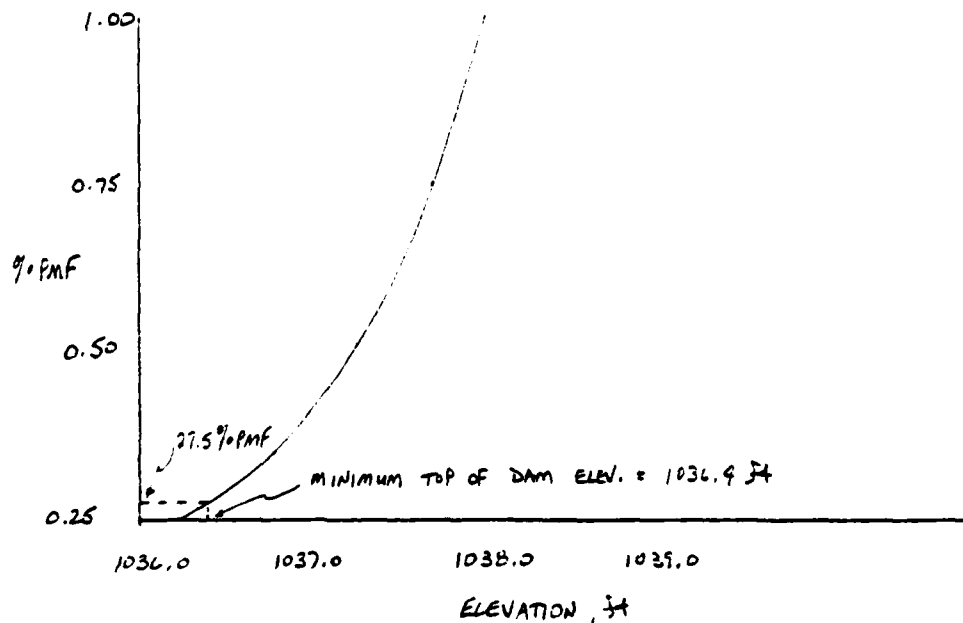
Box 280  
Beaver, Pa. 15009

Subject LAKE JO-ANN DAM S.O. No. \_\_\_\_\_  
SPILLWAY PROFILE AND Sheet No. 5 of 10  
CAPACITY ANALYSIS Drawing No. \_\_\_\_\_  
Computed by WDL Checked by \_\_\_\_\_ Date 4-2-80

### SPILLWAY PROFILE



### SPILLWAY CAPACITY ANALYSIS



\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE INEC-11  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 MBI UPDATE 04 JUN 79  
 \*\*\*\*\*

1 A1 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
 2 A2 HYDROLOGIC AND HYDRAULIC ANALYSES OF BRACCU DAM  
 3 A3 UNIT HYDROGRAPH BY SNYDER'S METHOD  
 4 B 300 0 30 0 0 0 0 0  
 5 B1 5  
 6 J 1 4 1 0.75 0.50 0.25  
 7 J1 1.0  
 8 K  
 9 K1 PUFF HYDROGRAPH TO DAM  
 10 M 1 1.62  
 11 P 0 24.0 102 120 130 140 1.0 0.05  
 12 F  
 13 M 2.16 0.57  
 14 X -1.5 -0.05 2.0  
 15 K 1  
 16 K1 ROUTING FOR BRACCU DAM  
 17 Y 1 1  
 18 Y1 1  
 19 \$A 12.6 13.77 34.9 82.6  
 20 \$E1023.5 1033.0 1040.0 1060.0  
 21 \$S1033.0 52.5 3.00 1.5  
 22 \$D1036.4 3.08 1.5 490  
 23 \$L 0 90 271 368 503  
 24 \$V1036.4 1036.7 1036.9 1037.1 1037.7  
 25 K 99



\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HLC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 NRJ UPDATE 04 JUN 79  
 \*\*\*\*\*

RUN DATE 04/04/80  
 TIME 16.59

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
 HYDROLOGIC AND HYDRAULIC ANALYSES OF BRACCO DAM  
 UNIT HYDROGRAPH BY SNYDER'S METHOD

JOB SPECIFICATION  
 NO NHR NMN IDAY IHR IMIN MEINC IPLT IPRI NSTAN  
 300 0 30 0 0 0 0 0 -4 0  
 JUPER 5 0 0 0 0 0 0 0 0 0

MULTI-PLAN ANALYSES TO BE PERFORMED  
 NPLAN= 1 NRTIO= 4 LRTIU= 1  
 RTIUS= 1.00 0.75 0.50 0.25

\*\*\*\*\*

SUB-AREA RUNOFF COMPUTATION

PUNOFF HYDROGRAPH TO DAM

ISTAQ ICOMP IECON ITAPE JPLT JPRI INAME ISTAGE IAJTU  
 1 0 0 0 0 0 1 0 0  
 IHYDG IJHG IAREA SNAP TRSQA TRSPC RATIO ISNOM ISAME LLOCAL  
 1 1 1.62 0.0 0.0 1.62 0.0 0.0 0 0 0

HYDROGRAPH DATA

PRECIP DATA  
 SPFE PHS R6 R12 R24 R48 R72 R96  
 0.0 24.00 102.00 120.00 130.00 140.00 0.0 0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT STRR ULTR RTIOL ERAIN STRKS RTIUK STRIL CNSTL ALSHX RTIMP  
 0 0.0 0.0 1.00 0.0 0.0 1.00 1.00 0.05 0.0 0.0  
 UNIT HYDROGRAPH DATA  
 TP= 2.16 LP=0.57 NIA= 0

RECESSION DATA  
 STRIQ= -1.50 GRCSN= -0.05 RTIUR= 2.00

UNIT HYDROGRAPH 28 LND-OF-PLRIUD UNKINATES, LAG= 2.16 HOURS, CP= 0.57 VOL= 1.00  
 26. 9. 191. 251. 273. 24. 197. 159. 128. 104.  
 84. 67. 54. 44. 35. 29. 23. 19. 15. 12.  
 10. 8. 6. 5. 4. 3. 2. 1. 0. 0.

104-1641 11-19 11-179 11-589 1  
008875 24-7 94-42 RA-92 WMS

# HYDROGRAPH ROUTING

# ROUTING FOR BRACCO DAM

[illegible]

SURFACE AREA=	13.	14.	35.	83.
CAPACITY=	0.	125.	290.	1431.
ELEVATION=	1024.	1033.	1040.	1060.
		CREL	SPM10	CUOM
		1033.0	52.5	3.0

JAM	UAFB	CUQD	EXPD	DAMWID	490.
3.1			1.5		

CREST LENGTH AT OR BELOW ELEVATION	0.	90.	271.	368.	503.
	1036.4	1036.7	1036.9	1037.1	1037.7

PEAK OUTFLOW IS 3651. AT TIME 42.00 HOURS.

DEAD DATE IS 2735. AT TIME 42.00 HOURS

1815. AT TIME 42.00 HOURS

STAY AROUND IS 866. AT TIME 42.50 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC FEET PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION STATION AREA PLAN RATIO 1 RATIO 2 RATIO 3 RATIO 4

HYDROGRAPH AT 1 1.62 3666. 2750. 1833. 917.  
 1 103.821 77.861 51.911 25.4511

ROUTED TO 2 1.62 3651. 2735. 1815. 866.  
 1 103.381 77.461 51.411 24.5211

# SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

RATIO OF PMI	MAXIMUM RESERVOIR W.S. LEV	ELEVATION STORAGE OUTFLOW	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS	INITIAL VALUE 1033.00 125. 0.	SPILLWAY CREST 1033.00 125. 0.	TOP OF DAM 1036.60 187. 987.
1.00	1038.06		1.66	229.	3651.	8.00	42.00	0.0			
0.75	1037.73		1.33	220.	2733.	7.00	42.00	0.0			
0.50	1037.29		0.89	208.	1815.	5.00	42.00	0.0			
0.25	1036.12		0.0	180.	800.	0.0	42.50	0.0			

SHEET 10 OF 10

APPENDIX E

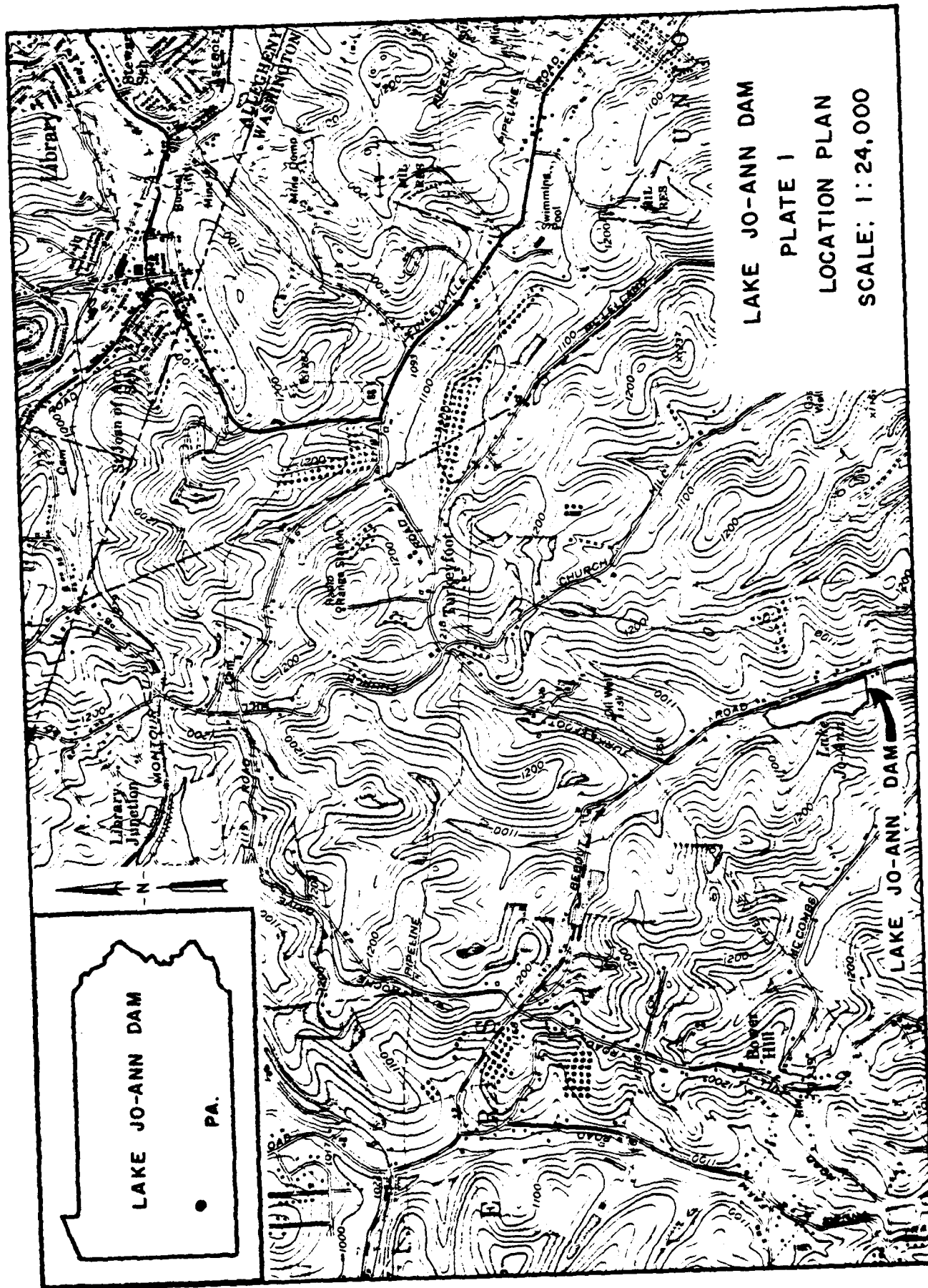
PLATES

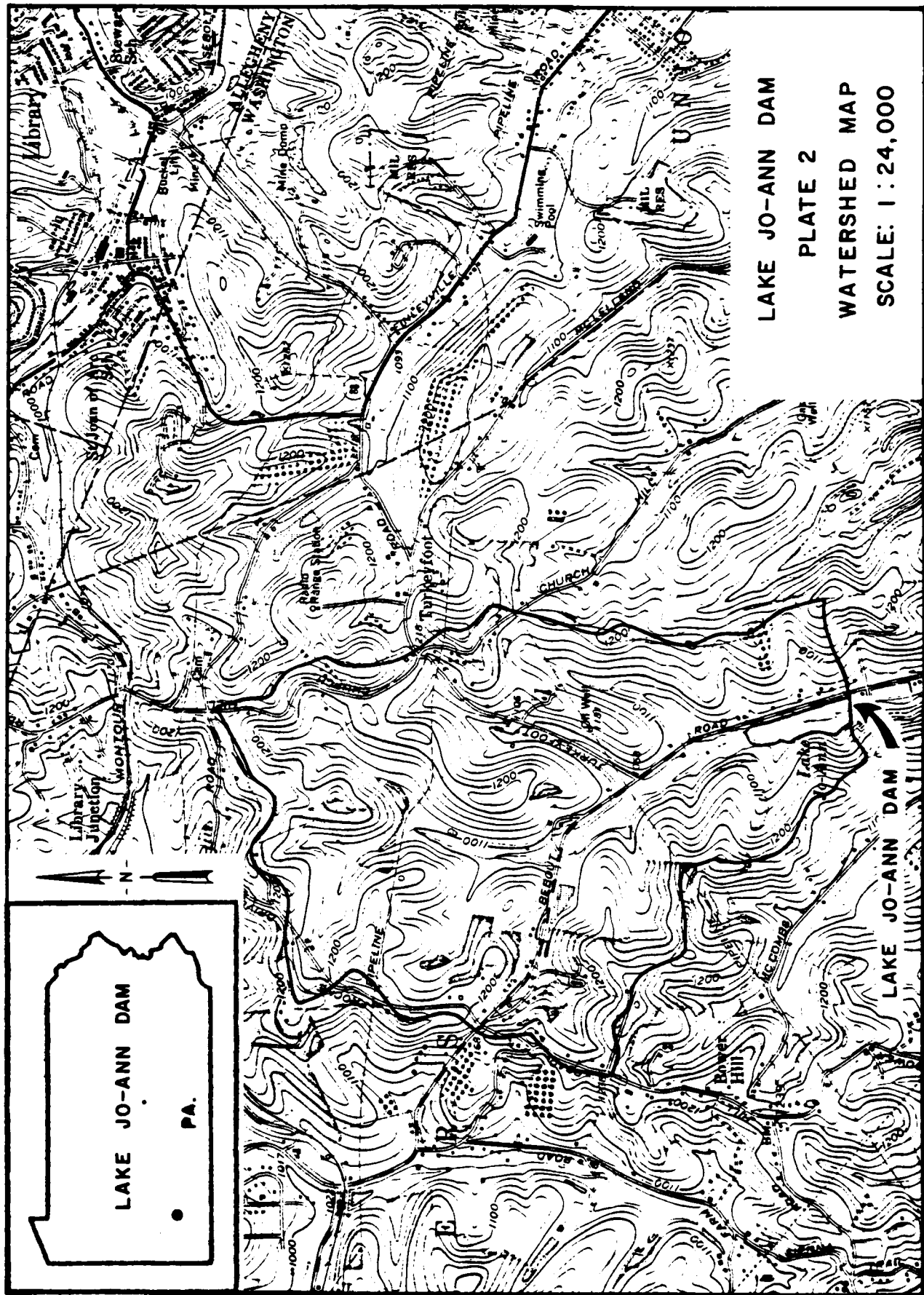
CONTENTS

Plate 1 - Location Plan

Plate 2 - Watershed Map

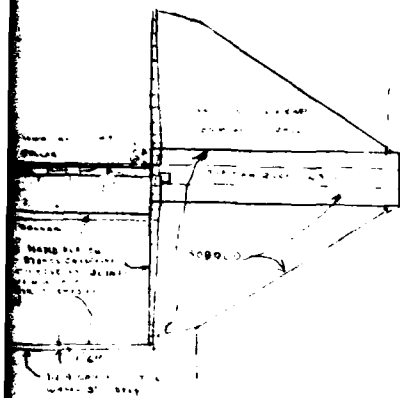
Plate 3 - Original Design Drawings (1950)



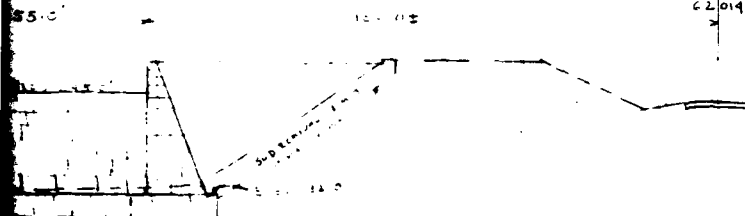








PLAN



CROSS SECTION



**NOTE:**

THIS DESIGN DRAWING IS NOT REPRESENTATIVE OF THE "AS BUILT" CONDITIONS. SEE THE TEXT AND FIELD SKETCH FOR "AS BUILT" CONDITIONS.

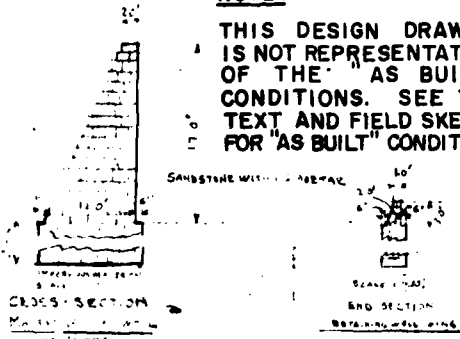


PLATE 3

ARTIFICIAL FISHING LAKE	
FOR JOSEPH BRACCO	
LOCATED PETERS TWP. WASHINGTON CO. PENNA.	
DRAWN BY CHECKED BY APPROVED BY	MOSE SMITH, P.E. CONSULTING ENGINEER SANDWELL BLDG. PITTSBURGH, PA.
REVISED	DATE
NO. 500948	DEPT 1530
500948	1530

2

APPENDIX F

REGIONAL GEOLOGY

LAKE JO-ANN DAM  
(Bracco Dam)  
NDI No. PA 00504, PennDER No. 63-60

REGIONAL GEOLOGY

Lake Jo-Ann Dam is located in an unglaciated area of the Appalachian Plateaus Physiographic Province. Bedrock units below the dam are members of the Monongahela Group, Pennsylvanian System. Bedrock in this formation is typically cyclic sequences of shale, limestone, sandstone, and coal.

Coal of a currently mineable character located below the dam includes the Pittsburgh coal at approximately Elevation 930 feet M.S.L. (or approximately 100 feet below the dam). According to the "Greater Pittsburgh Region Maps of Mined-Out Pittsburgh Coal," compiled by S. E. Cortis and others, 1975, the Pittsburgh Coal Company - Montour Mine No. 4 currently holds mineral rights to the coal and has some headings in the right abutment area of the dam. According to the owner, the reservoir area was a former strip mine area. The coal mined by this operation was probably the Redstone coal or the Sewickley coal.



**GEOLOGIC MAP**

**Lake Jo-Ann Dam**

**NDI No. PA 00504, Washington County**

Reproduced from

Greater Pittsburgh Region Geologic Map,  
Compiled by W. R. Wagner and others, 1975

Scale: One Inch Equals Approximately Two Miles  
See Legend, Next Page

# GEOLOGY MAP LEGEND

## GROUP FORMATION

## DESCRIPTION

Alluvium		Qt.	Sand, gravel, clay.
Terrace deposits			Sand, clay, gravel on terraces above present rivers; includes Carmichaels Formation.
DUNKARD	Greene		Cyclic sequences of sandstone, shale, red beds, thin limestones and coals.
	Washington	Pw	Cyclic sequences of sandstone, shale, limestone, and coal; contains Washington coal bed at base.
	Waynesburg		Cyclic sequences of sandstone, shale, limestone and coal; contains Waynesburg coal bed at base.
MONONGAHELA		Pm	Cyclic sequences of shale, limestone, sandstone and coal; contains Pittsburgh coal bed at base.
P. CONEMAUGH	Casselman	Pcc	Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.
	Ames		
	Glenshaw	Pcg	Cyclic sequences of sandstone, shale, red beds and thin limestone and coal; several fossiliferous limestone; Ames limestone bed at top.
ALLEGHENY	Vanport	Pa	Cyclic sequences of shale, sandstone, limestone, and coal; contains Brookville coal at base and Upper Freeport coal at top; within group are the commercial Vanport limestone and Kittanning and Clarion coals.
		Pa	
POTTSVILLE			Sandstone and shale; contains some conglomerate and locally mineable coal.
Mauch Chunk			Red and green shale with some sandstone; contains Wymys Gap and Loyalhanna limestones.
Pocono			Sandstone and shale with Burgoon sandstone at top.

FILMED  
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